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SCIENCE IMPROVES RULE-OF-THUMB METHODS
IN DOMESTIC SWISS CHEESE PRODUCTION

Improved methods based on extensive experimentation in the U. S. Department of Agriculture have helped to improve on the rule-of-thumb methods of making Swiss cheese handed down, generation after generation, by the early cheesemakers who emigrated to the United States from Switzerland. Today much of the domestic product compares favorably in quality -- flavor, texture, and eyes -- with the imported.

Research by the Bureau of Dairy Industry has partially cleared up the mystery of why domestic Swiss cheese once varied so greatly in quality, by revealing the part that certain bacteria play in converting milk to cheese of this type. Also the Bureau, in cooperation with State agencies, has introduced to the American industry new methods that have improved the quality of its products. Most significant of these are the clarification of the milk, which promotes proper eye formation, and the use of three essential bacterial starters as pure cultures. A lactobacillus and a thermophilic streptococcus promote proper acid development and whey drainage. Propionic bacteria (Propionibacterium shermanii) aid in the development of characteristic flavor and eye formation.

In the Bureau's laboratories, experimental manufacture of Swiss cheese starts with the addition of some skim milk to clean, good-quality whole milk, thus reducing the fat content, which favors better eye formation in the cured cheese. The milk is clarified, pumped to the Swiss kettles, and warmed to 91 degrees F. Then the three bacterial starters are added, and the milk is "set" with rennet to coagulate it. After about 30 minutes, when the curd is sufficiently firm, it is cut into cubes and gradually "harped" (1)* until the particles are about the size of wheat kernels.

The curd is stirred, or "foreworked," for an hour to "firm it up." Then, with continued stirring, the temperature is raised gradually in 30 minutes from 91 to 128 degrees F. This cooking firms the curd and expels some whey. The curd is ready for dipping when a handful, after being squeezed to expel the whey, will crumble into individual grains on being rubbed between the hands. It is dipped from the kettle by means of a dipping cloth, one end of which is rolled onto a flexible steel rod (2)*, and suspended momentarily above the kettle to allow free whey to drain (3)*. Then the curd, still enclosed in the cloth, is put in the cheese hoop and kneaded by hand (4)*. A circular cover is put on top of the hoop and pressure is applied.

The cheese is redressed regularly with dry cloths, inverted in the hoop, and pressed with gradually increasing pressure. Meanwhile, 3 hours after the curd was dipped, a sample of the cheese is taken for an acidity determination (5)*. The next morning another sample is taken for analysis. At this stage the rind has begun to form and the surface is yellow. The controlled fermentation and the pressure expel whey and "knit" the curd into a compact mass.

The pressed cheese is removed from the hoop, weighed, stamped with an identifying number, and placed in a brine tank in the cold room, which is kept at 50 degrees F. This brine solution, strong enough to float the cheese, incorporates salt into it, improves the flavor, and firms the rind. After 2 days in the brine and a total of 14 days in the cold room, the cheese is transferred to the warm room, where the temperature is 70 to 72 degrees F. and the humidity is about 80 percent. Throughout the curing process, the cheese is washed with salt water, inverted, and sprinkled with dry salt (6)* twice weekly.

The eyes form while the cheese is in the warm room and reach approximately the diameter of a 5-cent piece within about 6 weeks. They are the natural result of the formation of carbon dioxide during curing. Eye formation is accompanied by a characteristic bulging of the cheese. Curing is completed by keeping the cheese in the cold room until it is 4 to 5 months old. At the end of that time the cheese is cut (7)* and graded (8)*. A good Swiss cheese has holes or eyes that are large, round, shiny, smooth, few in number, and spaced evenly. It has no cracks and no small gas holes. The rind is smooth, uniform, clean, and free from cracks (9)*.

*Numbers in parentheses refer to pictures on other side, 8 by 10 glossy prints of which are free to writers and editors on request to the Press Service, Office of Information, U. S. Department of Agriculture, Washington 25, D. C.

